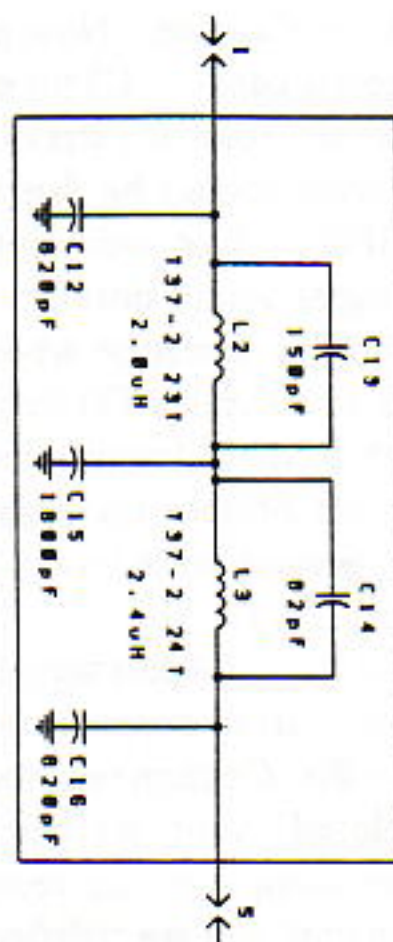
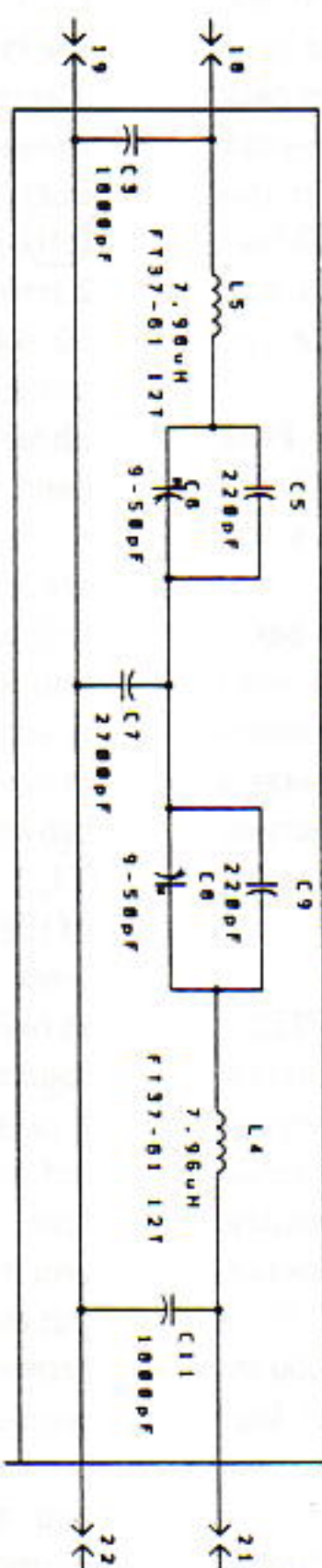


LOW PASS

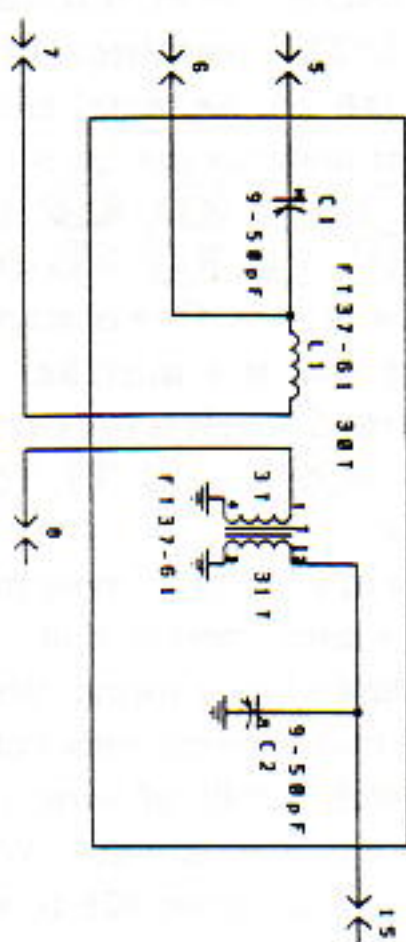


75m BAND MODULE

TX FILTER



RX FILTER



wire for this one. The first is to be the secondary and is 30 Turns of #28 Brown wire, the primary has 2 turns of Green #26 wire.

Wind the secondary first, then wind the primary over the secondary.

Band Module Alignment:

Now we are ready to do some aligning. Install the 75M bandmodule. Verify VFO frequencies listed in step 3 again. Connect the 75M station antenna to the Cascade. Now peak the band module pre-selector caps C1, C2 for strongest back ground noise level. Tune in a station and re-peak C1, C2. Receiver should be functional at this point, adjust BFO for best audio quality. (Make the received signal sound normal. This is best done by listening to someone whose voice you know.) Write down your BFO frequency.

Repeat with 20M bandmodule installed. Peak 20M bandmodule preselector caps C1, C2 for strongest back ground noise level. Tune in a station and re-peak C1, C2

Tune in a "strong" S9 plus signal on the band, verify Q17 gate voltage drops from 3 to 4 volts down to 2 to 3 volts. Confirm receiver audio mutes when PTT is closed. Verify RF gain pot operates correctly. This completes the receiver section. Resist going on until you are satisfied the receiver is working properly.

SECTION 7: MICROPHONE AMPLIFIER

Install Microphone amplifier components, Q12, U2, U3. Leave R8, C15, R13 out, they are not needed with the Radio Shack speaker mike. All the parts on the Product Detector schematic should now be populated. Note the C12 polarity pad is wrong, plus side to U3 pin 7. Note 22uF electrolytic caps aren't marked for polarity. SHORT LEAD is negative. Insert LONG lead into SQUARE pads.

Testing:

Connect a Kenwood or Radio Shack 2meter Speaker Mike. Verify the "MIKE" pin on J1 pin 2 is 2V DC when the PTT button is closed. Check U3 DC levels at pin 8 is 1 to 2 volts. Close PTT, speak into mike, confirm audio level at U3 pin 8 is at least 75 to 125mV peak to peak. Adjust R7 for equal DC voltage on U2 pin 1 and 2. This

gets the carrier balance close.

SECTION 8: POWER AMPLIFIER

Install PA chain components: C49, C50, C51, C52, C53, C55, C56, C57, C58, C59, C60, C62, C63, C64, C65, C66, C67, D12 [Note: Install D12 vertical with the banded end closest to the board. See drawing in Section 9 for details.], L4, L5, Q6 [Note: The PCB screen is wrong for the type of 2N2222 transistor that we supplied. There is a tab on the metal can 2N2222A, it should point towards the Q6 on the parts layout], Q8, R31, R32, R33, R34, R36, R38, R39, R40, R41, R42, R43, R44, R45 [Note: there are 2 trimpots in the kit. One is marked 500, it is a 50 ohm pot and is a mistake. Use the blue trimpot marked 501, it is the correct value, 500 ohms], R46, R99, T1, T2, T3, T6. Install 75M band module in J4.

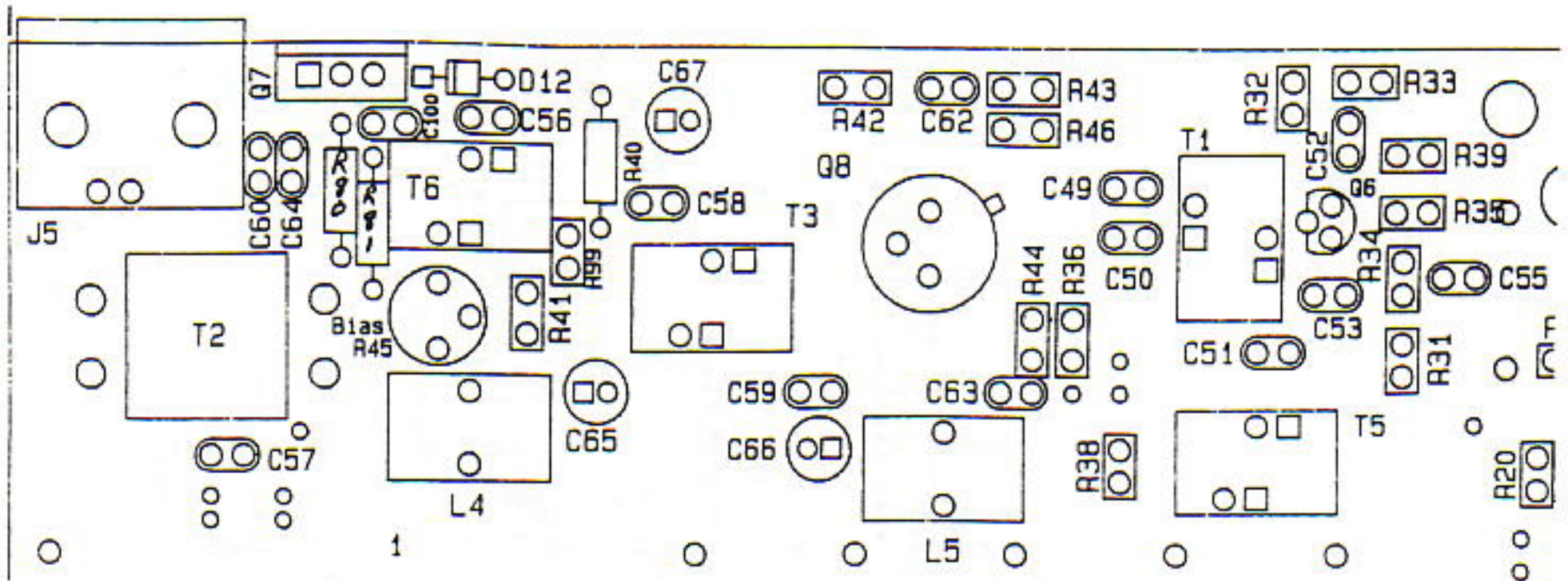
It is time to wind some more toroids, and you are about to learn another skill. This time you will be winding a bifilar toroid, which means that you will use two different colors of wire. The kit is supplied with 3 rolls of wire, a brown #26, a brown #28, and a green #26. You will use the brown #26 and the green #26 to wind the bifilar T1, 3, 4, 5, & 6. The #26 brown wire is the larger of the two brown wires in diameter. Cut off a 10" piece of each wire, prepare one end of each color as before, and then holding the two prepared ends together, twist the two wires so that there are about 8 twists per inch. When you finish, wind the toroid with 8 turns and then prepare the ends as before. The easiest way is to unwind 1 turn after you finish winding, prepare the ends, and then put the turn back on the toroid. You will place the brown wire ends in the round pads and the green wire ends in the square pads.

Install a heat sink on Q8. It is the TO5 style and is round. If you have some heatsink compound, it would be a good idea to put some on.

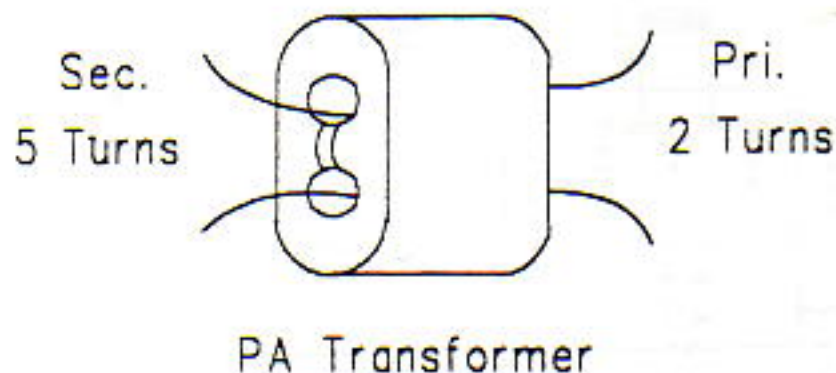
Next we will wind the PA output transformer, T2. This is the dark gray form that has two holes. We will use 5 turns of #26 magnet on the Low Pass filter side and 2 turns of #26 on the Q7 collector side. To wind five turns start on one end with a piece of the brown wire in your kit. Put

39-
4.7-
560-
1K-
47-
11K-
150-
180-
20-
SHORT
560-
TRIM
390-
20

C10



the wire through one of the holes then bring it back through the other hole. This counts as one turn. Put the wire back through the hole again, and bring it back through the second hole. You should have 2 wires through each hole and the start and the end of the wire are on the same end of the form. Repeat this until you have 5 wires in each hole. This is the 5 turn side. Now, start at the opposite end of the form and wind 2 turns of wire with the second piece of insulated wire. This is the Primary. It should have 2 turns or wires in each hole, and the two primary wires should be outside the same end as shown in the drawing.



Testing:

Press PTT, verify Q6 emitter voltage is 0.5 to 1 V, verify Q8 emitter voltage is 0.5 to 1 V. Adjust R45 for highest voltage on D12. Verify 12V collector voltage on Q6, Q8 and Q7 (not installed yet)

Now confirm the transmitted 75M RF levels in PA chain. Close PTT, speak into mike, R46 should have 1/2 to 1 volt peak to peak of 75M RF. R99, a 20-ohm base resistor should have 2 to 4 V

peak to peak of 75M RF across it.

You'll need to peak the two transmit filter trimmer capacitors C3, C4 on the band module board. Adjust C3 and C4 for maximum RF level at R99. While speaking into the mic, verify the RF signal at R99 doesn't appear "clipped" on the scope.

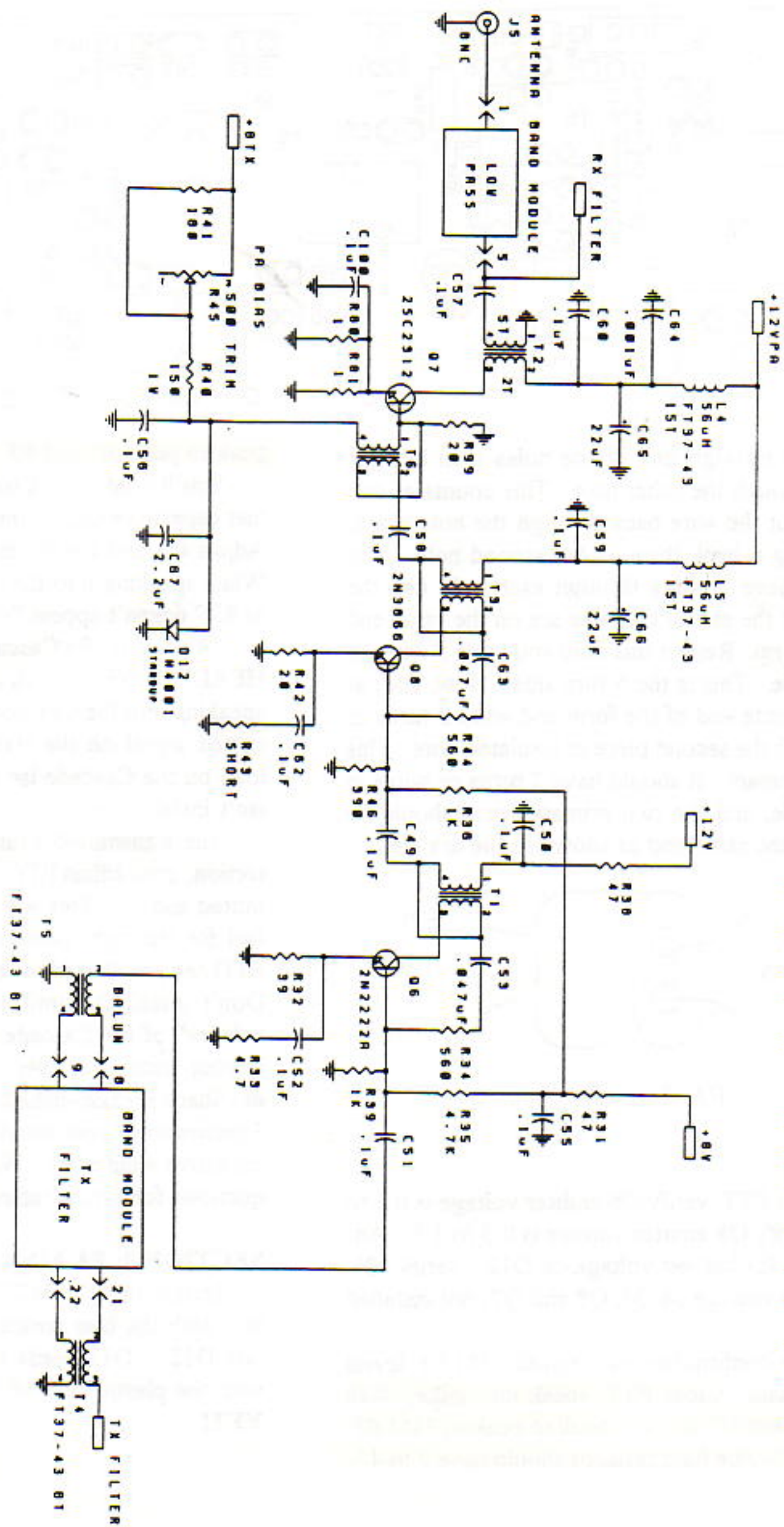
To listen to the Cascade transmitter audio use HEADPHONES on your station receiver while speaking into the Cascade mic. Tune in the transmitted signal on the station receiver. A dummy load on the Cascade isn't needed, the 2SC2312 isn't installed yet.

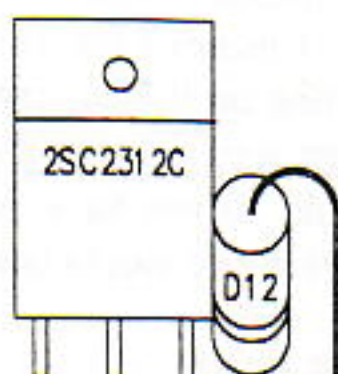
The transmitted audio should be free of distortion, now adjust BFO capacitor for "best transmitted audio". This will take some time to get a feel for the right position. After adjusting the BFO cap you'll need to retune the station receiver. Don't install Q7 until you're satisfied with the "clarity" of the Cascade transmitted audio heard in your station receiver. If you're using the Radio Shack speaker-mike try holding the mike about 3 inches from your mouth, holding it closer adds excessive wind noise. Write down your BFO frequencies for future reference.

SECTION 9: PA FINAL

Install the Q7 2SC2312. Position Q7 in contact with the bias temperature compensation diode D12. D12 needs to be in physical contact with the plastic case of Q7. **DON'T SOLDER YET!**

POWER AMPLIFIER





Place the 2SC2312 in the board, and make sure that it makes contact with D12 as shown above. Attach the back panel using the hardware for the BNC connector and the screw in the angle bracket. Carefully mark the position of the hole to mount the transistor on the back panel. Do this carefully, and try to be sure that the transistor is seated fully and making contact with the diode. After marking, remove the back panel, use a center punch to mark the spot for drilling, and drill a 1/8 inch hole in the back panel. Secure Q7 to the panel using a mica washer and 4-40 hardware. If you have heat sink compound, use it when securing Q7, apply some to D12 also. Attach the panel to the circuit board and try to avoid taking it off in the future.

Connect a 50 ohm, 10 watt dummy load to the antenna jack J5. Place a 2A ammeter in series with the 12V DC supply. Close the PTT, slowly decrease R45 while monitoring the J2 12V supply current. Adjust R41 so the idle supply current increases from 70mA to 250mA during TX. Do this without speaking into the mic. Confirm the Voltage at D12 is approximately .7 volts.

Now repeat the same audio test in Section 8 above. Listen to the transmitted audio in your station receiver using headphones. The audio should be free of distortion as before. Confirm the J2 12V supply current peaks to 3/4 to 1 1/4 amp on voice peaks. Over-driving the NE602 first transmit mixer can cause distorted audio. To reduce the drive level, reduce the mike gain resistor R63 from 10K TO 4.7K.

Use a calibrated watt meter to verify the output power levels on both bands. Verify the peak RF levels at J5, the antenna jack, are 50 to 60 Volts peak-to-peak on 75M, 40 to 50 volts peak-to-peak on 20M. Five watts pep equates to 45V

peak-to-peak into a resistive 50 Ohm load.

Now readjust the carrier balance R7. Un-plug the mike connector, close the PTT line with a clip lead. Null the 9MHz RF carrier seen at the antenna jack. You should be able to reduce it to under 0.5V peak to peak.

If you use a battery for the 12V supply, make sure it doesn't drop below 11 Volts. It is a good idea to check this often.

SECTION 10: FINAL ASSEMBLY

We are ready for the final assembly of the Cascade into the Case. Attach the front panel, using the appropriate screws. The 3 screws for the tuning capacitor may have to be filed down. We were unable to obtain a supply of 3/16" long screws, so we supplied 1/4" instead. You will have to file them so that they just fit through the capacitor, but don't touch the plates. You should have at least 1/16" clearance between the end of the screw and the front plate of the capacitor. Put the nuts and washers on the controls, the 6-32 screw in the bracket, and you are finished with the panel. Now attach the pointer to the hub, and the hub to the shaft, being careful to insure that you get it adjusted correctly so that the pointer won't rub on the panel. Check the pots to make sure that the tabs have been broken off so the panel fits flush. It is important to get the nuts on the mic jack.

You should have the front and back panels both mounted. The next operation is to remove the temporary wire jumper between W1 and W2. Use solder wick. Cut a piece of the tiny coax cable to fit between W1 near the front panel and W1 next to the band module. You will install this on the bottom of the board. The coax is only grounded at one end, the one nearest the band module. **DO NOT GROUND** the end of the coax nearest the front of the board. The center conductor of the coax is connected at both ends, but the braid is only connected on the end closest to the band module.

Install W2 in the same manner as W1, remembering that the coax is only grounded nearest to the band module end.

Next mount the plastic latches on the bottom